FY2004 Proposal

for the

CWA, Section 319(h)

Agricultural/Silvicultural Nonpoint Source Program

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
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Nonpoint Source Summary Page
for the
CWA, Section 319(h) Agricultural/Silvicultural Nonpoint Source Program

1. **Title of Project:** Field Validation of the Texas Phosphorus Index in the Poultry Areas of Texas

2. **Project Goals/Objectives:** 1) To determine the effects of selected soil properties in Sam Rayburn Reservoir and Lake O' the Pines watersheds and other poultry producing areas of the state in East and South Central Texas to measure and predict P runoff; 2) To compare and correlate Mehlich III and soil solution soluble P extracts to runoff P; 3) To validate and/or modify Texas Phosphorus Index as a predictive tool for classification of field sites relative to P loss potential; 4) Evaluate the TCEQ soil sampling guidance for soil test P reproducibility.

3. **Project Tasks:** 1) Select sites for rainfall simulations and result demonstrations; 2) Establish result demonstrations and conduct rainfall simulations; 3) Measure and evaluate Mehlich III extractable P and dilute salt soil extractable P; 4) Compare PI risk assessment to runoff P concentrations; 5) Validate and/or modify PI and provide educational programs regarding PI use and P runoff management; 6) Compare TCEQ soil sampling techniques to an intensively sampled land management unit.

4. **Measures of Success:** The information attained from the field studies will help validate and improve the Texas PI. With information from the poultry areas of Texas and the on-going studies on the High Plains and in the Leon/Bosque River watersheds, quantitative assessments to predict the amount of P in runoff utilizing the Texas PI can be estimated. The runoff analyses will help determine the form of P, and whether it is mainly solution soluble or suspended. This will enable identification of appropriate BMPs to reduce the amount of P leaving fields, thus decreasing the amount of P reaching the surface water resources. Evaluations of the Mehlich III and dilute salt extractants at different soil depths will demonstrate differences among the extracts and help identify the most effective soil depth and extractant to predict runoff P.

5. **Project Type:** Statewide (X) Watershed ( ) Demonstration ( )

6. **Waterbody Type:** River (X) Reservoir (X) Groundwater ( ) Other ( )

7. **Project Location:** Poultry producing areas of Texas including area from Sulfur Springs to Mt. Pleasant to Nacogdoches (segments such as 0306,0404,0404B,0505, 0505B, 0506, 0512A,0512B, 0604A, 0604B, 0606A, 0610A, 0611, 0611A, 0611B, 0611C, 0612B, and 0615) to include Sam Rayburn Reservoir (0610), Lake O' the Pines area (0402, 0403, 0404, 0404B), area around Brazos County (such as 1242, 1242K, 1242L, 1242M, 1242P, and 1247A) and area around Gonzales County (such as 1803B and 1803C).

8. **NPS Management Program Reference:** USA Agricultural/Silvicultural Nonpoint Source Management Program, approved February 15, 2000.

9. **NPS Assessment Report Status:** Impaired (X) Impacted ( ) Threatened ( )

10. **Key Project Activities:** Hire Staff (X) Monitoring ( ) Regulatory Assistance ( ) Technical Assistance (X) Education (X) BMP Implementation ( ) Demonstration Project (X) Other (X)

11. **NPS Management Program Elements:** Milestones No.

12. **Project Costs:** Federal ($393,220), Match ($273,693)

13. **Project Management:** Texas State Soil and Water Conservation Board

Cooperating Entities: Texas Cooperative Extension, Texas Water Resource Institute, USDA Natural Resources Conservation Service

14. **Project Period:** February 2, 2004 – April 31, 2007.

FIELD VALIDATION OF THE TEXAS PHOSPHORUS INDEX IN THE POULTRY AREAS OF TEXAS
TEXAS COOPERATIVE EXTENSION
FY04 CWA Section 319(h)

Preliminary Observations from Project Number 02-11: The QAPP was approved in late March, 2003. Site selection had already been initiated and was completed by the end of April. Rainfall simulations were conducted on the High Plains through a project with Texas Cattle Feeders Association (TCFA) in May and June and started in Erath County in late June. We have been able to complete an average of two sites per week with the exception of one week when we only completed one site. The simulations at each site are taking about 1.5 to two days. With travel and set up/break down time, it is taking us Monday through Friday to complete two sites. We work in the field one week and prepare samples the next week. We have completed 13 sites as of September 26, 2003. These locations have been located in Erath County (12) and Hamilton (1) counties. The other seven sites will be taken from Comanche County. The analysis of the water is done each week. No statistical analysis has been done at this time on the dissolved phosphorus (P) or total P. The soil samples have been dried and ground, but no analyses have been done yet. All of the time in the lab during the week we are on campus is spent getting the water samples ready for analysis and getting ready for the next week of sampling. Observations in the field are: 1. A good stand of grass or other vegetative cover decreases the amount of sediment and runoff volume regardless of the slope; 2. As the slope increases, the less time it takes to get runoff; 3. Well aggregated soils and coarser textured soils have less runoff and require more time to initiate runoff; 4. Plowed fields have the greatest sediment release and often lower volumes of runoff water; 5. Overgrazed and/or compacted soils have the greatest runoff volume, greatest sediment transport, and require the least amount of time to initiate runoff. These results were expected. The P concentrations in the runoff water and sediment will be the main deciding factors for the study. Based upon our field observations, a well managed pasture has the least potential to release P off site.

Problem/Need Statement:
Phosphorus is an essential element in plant and animal nutrition. However, it also has been identified as an element that may serve a controlling function in the occurrence of eutrophication in surface waters. Eutrophication has been identified as one of the major causes of impaired water quality in the United States (USEPA, 1996). It restricts water use for fisheries, recreation, industry, and drinking due to the increased growth of undesirable algae, aquatic weeds and resulting oxygen shortages caused by their death and decomposition (Sharpley et al., 2000).

Although watershed-scale studies are important to evaluate gross potential nutrient losses, research has clearly shown that field-scale evaluations will be most critical for effective targeting of limited resources. Significant effort has been directed toward development of predictive tools which can be used to estimate potential nonpoint source losses of P. One example is a simple P index developed by the U.S. Department of Agriculture, Agricultural Research Service, as a field-level screening tool to rank the vulnerability of fields as sources of P loss in runoff water (Lemunyon and Gilbert, 1993).

The Phosphorus Index (PI) is designed to provide a basic assessment of both source and transport factors (collectively referred to as site factors) controlling P loss in surface runoff. Source factors include soil test P level, and inorganic and organic fertilizer phosphorus application rates and methods of application. Transport factors include proximity of the nearest field edge to a named stream or lake, runoff class and erosion potential. In Texas, the PI is a simple 8 x 5 matrix that combines site factors with a series of condition classes which identify Very Low, Low, Medium, High, and Very High levels of runoff potential. Site factors and condition classes are assigned weighted values based on relative importance. Utilizing field specific data, condition classes are assigned for each site factor and enable calculation of a numeric point value. Total index points for an individual site are then compared to a standard index to determine overall P runoff potential for the site.

Gburek et al. (1996) found that when the original PI was applied to a larger watershed in Pennsylvania, its field rankings did not accurately identify all areas with substantive impacts on stream water quality.

Sharpley et al. (2000) reported that since the overall flow systems of upland watersheds are largely fixed in space, limited opportunity exists to control or manipulate the hydrology of these systems. Thus, the most realistic and likely most effective means for modification of potential P losses will be through management of the source terms of the PI.

One key area of concern deals with the soil test P source factor and its relationship to potential P loss. Research in Texas has shown that soil test P level can be highly dependent on several site factors including soil type, field history, P source, and soil test extractant. A first step in refining effective site classification strategies, such as the PI, is to evaluate the efficiency of the key soil test parameter and its relationship to other source and transport variables.

Rainfall simulation has been used as a tool for predicting the effects of site specific characteristics on potential P loss. It is much easier, more rapid, and cost effective than watershed scale studies. Most importantly, it offers an opportunity to verify the accuracy of less intensive methods, such as the PI, by examining the impacts of specific source and transport parameters on measured and predicted outcomes.

In theory, the PI provides a reasonably rapid approach for planners and land managers to identify sites with the greatest potential to contribute to nonpoint source pollution. In addition, it enables comparison of selected alternative management practices which can be used to reduce P losses. However, very limited research has been conducted to provide field validation of the effectiveness of the PI for predicting actual site vulnerability. Weighting factors for both the source and transport factors, and vulnerability classifications largely have been intuitively defined. In addition, other soil and site factors may play important roles in controlling the potential for P loss under specific environmental conditions.

Field studies for this project will be conducted on sites within the major poultry producing areas of Texas. Based on the results of this project, the project in the Leon/Bosque River watersheds, and the TCFA project on the High Plains concentrating on cattle feed yards, we should be able to establish scientifically based economic and environmental P thresholds and suggest revisions to NRCS to improve the Texas Phosphorus Assessment Tool, or the Texas PI.

General Project Description:
Study sites in the poultry producing areas of Texas, mainly an area from Sulfur Springs to Mt. Pleasant to Nacogdoches, Sam Rayburn Reservoir watershed (see Fig. 1), Lake O' the Pines watershed (see Fig. 2), and areas around Brazos and Gonzales Counties (see list of potential water body segments on Summary Page) will be selected based on predetermined characteristics designed to facilitate the evaluation of specific input or related variables of the PI. Emphasis will be placed on selection of soil series which represent the dominant series in the region and state. A total of 40 sites representing the dominant soil series used as poultry litter application fields will be evaluated in three years of the study (13 to 14 sites per year).

Soil parameters to be used in site selection:

a) PI risk assessment: L, M, and VH.
b) Soil test P: L/M/H, >200 ppm.
c) pH: non-calcareous (pH < 7.5) soils and calcareous (pH = 7.5 or greater) soils within each of the PI/soil test P parameters.
d) Mineralogy, slope, leaching index, etc. will be documented for the PI.

For each field site, the PI will be determined based on a thorough site evaluation conducted by Texas Cooperative Extension (TCE) and/or USDA-Natural Resources Conservation Service (NRCS) personnel. Each site will be subjected to a soil characterization by USDA-NRCS and/or TCE staff that is a certified nutrient management specialist in Texas

Rainfall simulations will be conducted to estimate runoff P levels from field sites. Specific locations within each site will be selected to best represent the characteristics and properties upon which the PI characterization was based. These will include the soil series and related runoff and erosion potential classifications, slope, vegetative cover, proximity to nearest water body, organic and inorganic nutrient application rates and timing of application.

The rainfall simulations will be conducted using a Tlaloc 3000 rainfall simulator built by Joern's Inc. The simulator is based on the design of Miller (1987), and is an aluminum frame suspending a single low pressure, square pattern nozzle approximately 3 m above the soil surface. The simulator is capable of variable application rates up to 7.62 cm (3 in.) per hr. Based on this nozzle size and operating pressure, the actual application rate will be 7.5 cm per hr. This rate is being used across the nation for the P Benchmark Soils Project on which Sam Feagley is a cooperator. The rate is equivalent to the 1hr/10yr storm event for Stephenville, Texas. Simulations will be conducted on 1.5 m x 2 m plots. All rainfall simulation procedures will be conducted using modified procedures from the SERA-17 National P Project guidelines for rainfall simulations.

One rainfall simulation, instead of three, will be conducted on each of four plots at each of the 40 locations, providing four replications for statistical comparison. Runoff samples (50 mL) will be collected during each simulation at 5 minute intervals (5, 10, 15, 20, 25, 30 minutes and a composite (100mL for water chemistry analyses and 50 mL for NO_3-N)) after runoff is initiated. Runoff weight will be recorded at one minute intervals after initiation of runoff and a total runoff weight will also be recorded. Water samples will be analyzed for pH, EC, nitrate-N, Ca, Mg, Na, K, P, S, and B by the TCE Soil, Water and Forage Testing Laboratory (Provin, 2003). The nitrate-N will be analyzed on the composite sample only from an additional 50 mL sample that is not acidified in the field, just iced. The acid used renders the nitrate-N instrumentation unusable. Sediment samples will be collected from selected locations and will be analyzed for sediment load, solution soluble P and sediment bound P.

A 20 to 40 A area will be selected to evaluate the three soil sampling techniques that are approved by TCEQ (TCEQ, 2003). The three techniques are professional judgment (recommended by TCE Soil and Crop Sciences), simple random sampling, and systematic random sampling. Initially, 0-2, 2-6, and 0-6 inch samples will be collected on a 0.5 A grid with four cluster samples at the same depths collected every 10 0.5 A samples randomly selected across the field. Each of these samples will be analyzed for P using Mehlich III by ICP. The cluster samples will be used to determine the variability within the field. A P soil map will be constructed for the field from this information. At the same time these samples are being collected, 15 subsamples will be collected according to the three approved sampling techniques at the three depths. The collected subsamples will be combined into one sample representing the land management unit (LMU). These samples will be analyzed for P using Mehlich III. All subsampling locations will be located and recorded using GPS. The three sampling techniques will be evaluated based upon reproducibility and accuracy compared to the intensive sampling. The number of samples for this part of the project will be approximately 200.

Complementary components of the project will include additional soil and litter samples. One composite litter sample from one representative house from each cooperating producer will be collected, if the producer will allow us to collect a litter sample. Biosecurity is extremely important in poultry, thus if the producer does not allow us entrance into a house, we will not be able to collect a sample. The litter sample is not a critical part of this project since the concentration of P in the litter is not a part of the PI. When litter samples are collected, they will be analyzed for total N, P, K, Ca, Mg, Na, B, Fe, Mn, Zn and Cu, % moisture, pH and EC (Provin, 2003). Additional soil samples will be collected to more intensively evaluate correlations between soil test P in the target region by analyzing selected incoming client soil samples at the TCE Soil, Water and Forage Testing Laboratory. Approximately 150 samples will be selected for analysis per year. These samples also will be analyzed for the same analyses as the rest of the soil samples listed above..

Selected Mehlich III and SSSP extracts will be analyzed by colorimetric methods, and all elemental samples will be analyzed by ICP methods. This will provide the needed insight into the influence of soluble organic P that will be required in order to establish rigid laboratory methodology and protocols. All other soil test parameters will be determined using the established standard operating procedures of the Soil, Water and Forage Testing Laboratory.

Data will be analyzed utilizing standard statistical methods including regression, analysis of variance, and mean separation (SPSS, 2001).

This proposal addresses agricultural activities in the following areas and water body segments: Poultry producing areas of Texas including area from Sulfur Springs to Mt. Pleasant to Nacogdoches (segments such as 0306, 0402, 0404, 0404B, 0505, 0505B, 0506, 0512A, 0512B, 0604A, 0604B, 0606A, 0610A, 0611, 0611A, 0611B, 0611C, 0612B, and 0615) to include Sam Rayburn Reservoir (0610) and Lake O' the Pines (0403), area around Brazos County (such as 1242, 1242K, 1242L, 1242M, 1242P, and 1247A) and area around Gonzales County (such as 1803B and 1803C).

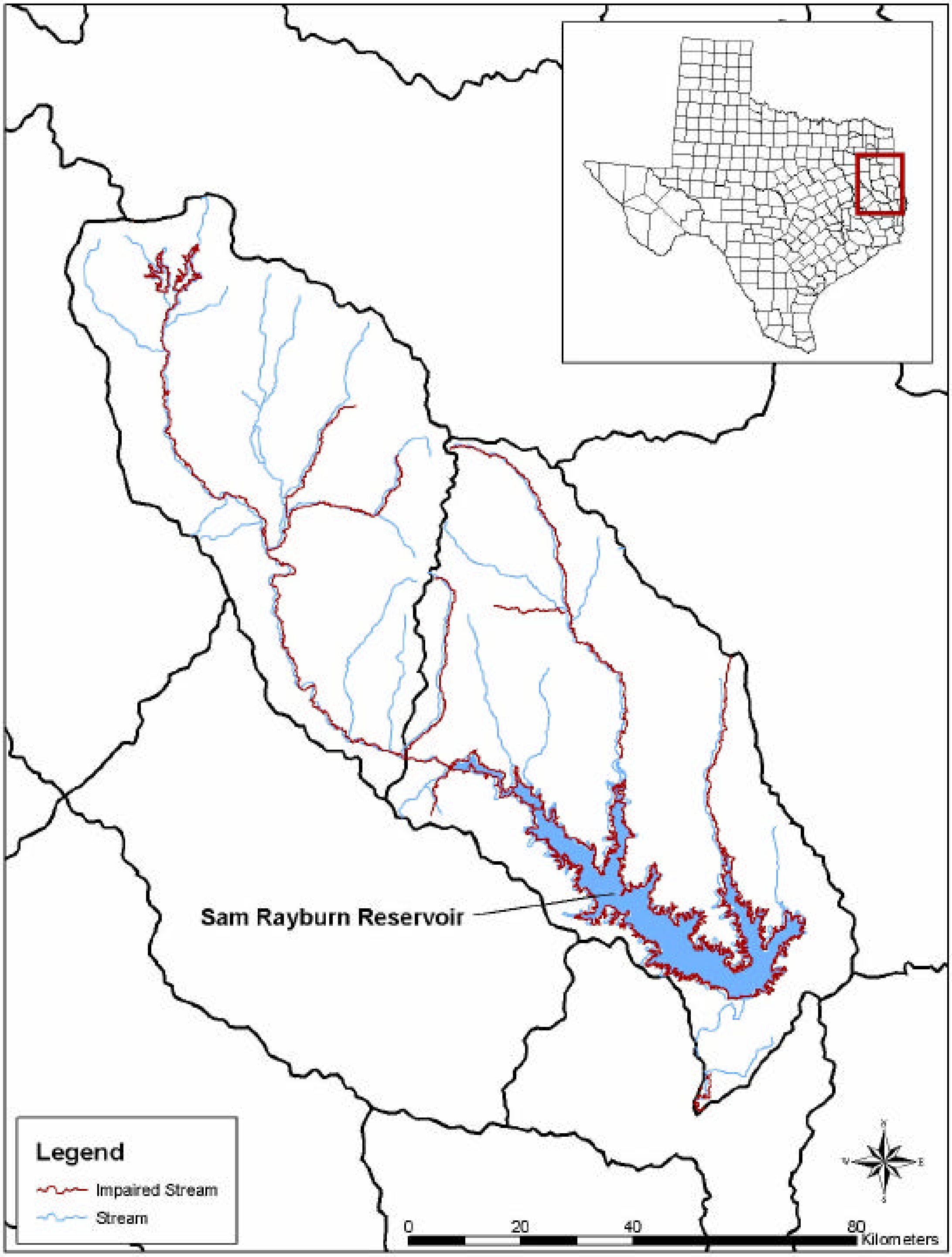

Figure 1. Sam Rayburn Reservoir watershed map showing impaired water body segments.

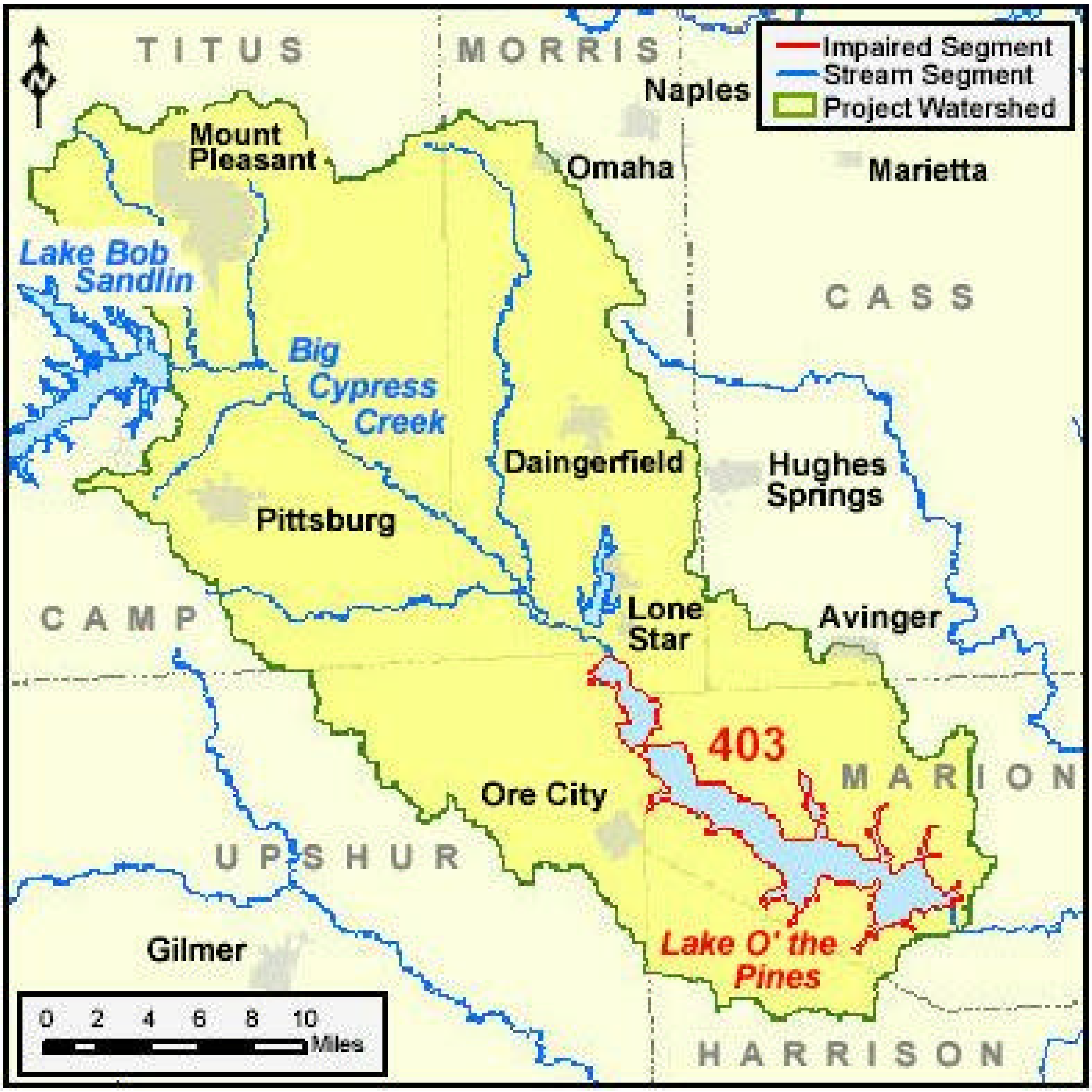

Figure 2. Lake O' the Pines watershed map showing impaired water body segments.

Almost all of the water body segments are listed as bacteria impaired. The potential areas and impairment parameter are listed in Table 1. All of the segments listed are from the draft Texas 2004 Clean Water Act Section 303(d) List.

Table 1. Water body segments where poultry agriculture is in or near.

Water Body Segment ID	Water Body Segment Name	Parameter
0306	Upper South Sulphur River	high pH, depressed DO
0402	Big Cypress Creek Below Lake O' the Pines	depressed DO, low pH, Hg, Pb
0403	Lake O' the Pines	depressed DO
0404	Big Cypress Creek Below Lake Bob Sandlin	bacteria
0404B	Tankersley Creek	bacteria
0505	Sabine River Above Toledo Bend Reservoir	bacteria
0505B	Grace Creek	bacteria, depressed DO
0506	Sabine River below Lake Tawakoni	bacteria
0512B	Elm Creek	bacteria
0604A	Cedar Creek	bacteria
0604B	Hurrican Creek	bacteria
0606A	Prairie Creek	bacteria
0610	Sam Rayburn Reservoir	Hg, depressed DO
0610A	Ayish Bayou	bacteria
0611	Angelina River Above Sam Rayburn Reservoir	bacteria
0611A	East Fork Angelina River	bacteria, Pb
0611B	La Nana Bayou	bacteria
0611C	Mud Creek	bacteria
0612	Attoyac Bayou	bacteria
0615	Angelina River/Sam Rayburn Reservoir	Hg, depressed DO
1242	Brazos River above Navasota River	bacteria
1242K	Mud Creek	bacteria
1242L	Pin Oak Creek	bacteria
1242M	Spring Creek	bacteria
1242P	Big Creek	bacteria
1247A	Willis Creek	bacteria
1803B	Sandies Creek	Bacteria, depressed DO
1803C	Peach Creek	bacteria

The Objectives of This Project are as Follows:

1) Determine the effects of selected soil properties on measured and predicted P runoff.
2) Compare and correlate Mehlich III soil test and soil solution extractable P levels to runoff P.
3) Validate and/or modify the Texas Phosphorus Index as a predictive tool for classification of field sites relative to P loss potential.
4) Evaluate the TCEQ soil sampling guidance for soil test P reproducibility.

Literature Cited:

Gburek, W.J., A.N. Sharpley, L. Heathwaite, and G.J. Folmar. 2000. Phosphorus management at the watershed scale: A modification of the phosphorus index. J. Environ. Qual. 29:130-144.

Lemunyon, J.L. and R.G. Gilbert. 1993. Concept and need for a phosphorus assessment tool. J. Prod. Agric. 6:483-486.

Miller, W.P. 1987. A solenoid-operated, variable intensity rainfall simulator. Soil Sci. Soc. Am. J. 51:832-834.

Sharpley, A.N., B. Foy, and P. Withers. 2000. Practical and innovative measures for the control of agricultural phosphorus losses to water: An overview. J. Environ. Qual. 29:1-9.

Provin, Tony. 2003. Standard Operating Procedures (SOPs). Soil, Water and Forage Testing Laboratory, Texas Cooperative Extension.

TCEQ Regulatory Guidance, Water Quality Division. 2003. Soil sampling for nutrient management plans. RG-408.

USEPA. 1996. Environmental indicators of water quality in the United States. EPA 841-R-002. USEPA, Office of Water, U.S. Gov. Print. Office, Washington, D.C.

FIELD VALIDATION OF THE TEXAS PHOSPHORUS INDEX
Texas Cooperative Extension
FY02 CWA Section 319(h)

WORKPLAN
2/2/04 - 4/31/07

Tasks, Objectives, Schedules, and Estimated Costs:

TASK 1: Select sites for rainfall simulations and result demonstrations.
Costs: $39,066 (Federal), $27369 (Match), $66435 (Total)

Objective: 1. Determine the effects of selected soil properties on measured and predicted P runoff.

Subtask 1.1 Work with TSSWCB personnel to develop a QAPP and submit to TSSWCB and EPA for approval before data collection begins. (Start Date: Month 1; Completion Date: Month 2.)

Subtask 1.2 Work with County Extension Agents (CEAs), TSSWCB personnel, North East Texas Municipal Water District, and NRCS agronomists and soil scientists in Camp, Wood, Upshur, Hopkins, Titus, Morris, Cass, Marion, Harrison, Gregg, Cherokee, Nacogdoches, San Augustine, Angelina, Smith, Rush, Sabine, Shelly, Panola, Guadalupe, Gonzales, Lavaca, Jackson, Robertson, Milam, Burleson, and Brazos counties to identify areas with PI risk ratings of low, medium, and very high, non-calcareous vs calcareous, and soil test P low to high and >200 ppm. A range in mineralogical characteristics and dominant soil series where manure is applied will also be part of the selection criteria. (Start Date: Month 1; Completion Date: Month 24.)

Subtask 1.3 Collect and analyze soil samples from selected areas. (Start Date: Month 2; Completion Date: Month 24.)

Subtask 1.4 Select field sites for rainfall simulation. (Start Date: Month 2; Completion Date: Month 24.)

Deliverables:
- ? QAPP.
- ? Soil test results for Mehlich III and dilute salt extracts.
- ? List of number of sites per county.

TASK 2: Establish result demonstrations and conduct rainfall simulations.
Costs: $117,196 (Federal), $82,109 (Match), $199,305 (Total)

Objective 1: Determine the effects of selected soil properties on measured and predicted P runoff.

Subtask 2.1 Establish rainfall simulation sites. (Start Date: Month 3; Completion Date: Month 30.)

Subtask 2.2 Conduct rainfall simulations and collect soil and water samples from simulation sites only and analyze water samples. (Start Date: Month 3; Completion Date: Month 32.)

Subtask 2.3 Analyze water samples for pH, EC, NO_3^--N, Ca, Mg, Na, K, P, B, and S.

Subtask 2.4 Analyze selected sediment samples for pH, EC, NO_3^--N, Ca, Mg, Na, K, P, B, sediment load, and S.

Deliverables:
- ? P concentrations in selected sediments.
- ? Chemical analyses of simulated rainfall runoff.

TASK 3: Measure and evaluate soil test extractable P and dilute salt soil extractable P.
Costs: $117,197 (Federal), $82,109 (Match), $199,306 (Total)

Objective 2: Compare and correlate different soil tests and soil solution extractable P concentrations to runoff P.

Subtask 3.1 Analyze soils samples for Mehlich III extractable P. (Start Date: Month 3; Completion Date: Month 34.)

Subtask 3.2 Analyze soil samples for soil solution soluble P and selected samples for sediment bound P. (Start Date: Month 3; Completion Date: Month 34.)

Subtask 3.3 Analyze all soil samples for pH, EC, NO_3^--N, Ca, Mg, Na, K, P, S, and B through TAMU Soil, Water and Forage Testing Laboratory (Routine + B). (Start Date: Month 3; Completion Date: Month 35.)

Subtask 3.4 Analyze extracted soil P using ICP and colorimetric (selected samples) techniques. (Start Date: Month 3; Completion Date: Month 35.)

Deliverables:
? Comparison of solution soluble and sediment bound P in the runoff.
? Comparison of ICP vs colorimetric P from soil samples.
? Comparison of Mehlich III and dilute salt extractable P concentrations from soil samples.
? Comparison of extractable P concentrations to soluble and sediment bound runoff P.

TASK 4: Compare PI risk assessment to runoff P concentrations.
Costs: $39,066 (Federal), $27,369 (Match), $66,435 (Total)

Objective 3: Validate and/or modify the Texas PI as a predictive tool for classification of field sites relative to P loss potential.

Subtask 4.1 Compare initial PI risk assessment to runoff P. (Start Date: Month 4; Completion Date: Month 36)

Subtask 4.2 Compare initial PI risk assessment to different extractable P concentrations. (Start Date: Month 3; Completion Date: Month 36)

Deliverables:
? Case studies evaluating the success of the PI for predicting low, medium, or very high potential for P runoff.
? Information dissemination through CEAs with multi-county meetings and field days.

TASK 5: Validate and/or modify PI and provide educational programs regarding PI use and P runoff management.
Costs: $39,066 (Federal), $27,369 (Match), $66,435 (Total)

Objective 3: Validate and/or modify the Texas PI as a predictive tool for classification of field sites relative to P loss potential.

Subtask 5.1 Conduct initial attempt to modify the PI to predict actual P in runoff based upon PI points. (Start Date: Month 6; Completion Date: Month 38.)

Subtask 5.2 Conduct educational outreach through CEAs and using multi-county meetings to educate landowners, integrators, and managers about runoff P and use of the PI as a management tool. (Start Date: Month 6; Completion Date: Month 38.)

Subtask 5.3 Recommend potential changes to PI with NRCS and incorporate into Nutrient Management Certification Short Course. (Start Date: Month 13; Completion Date: Month 38.)

Subtask 5.4 Provide updates and training for TCEQ, TSSWCB, and NRCS personnel and other groups and organizations on PI use and proposed modifications. (Start Date: Month 13; Completion Date: Month 38.)

Deliverables:
- Provide recommended modifications for PI to improve accuracy.
- Educational outreach for landowners, integrators, and managers in the target regions.

Task 6. Evaluate the TCEQ soil sampling guidance for soil test P reproducibility.
Cost: $39,066 (Federal), $27,369 (Match), $66,435 (Total)

Objective 4. Evaluate the TCEQ soil sampling guidance for soil test P reproducibility.

Subtask 6.1 Select a land management unit containing 20 to 40 A for intensive sampling. (Start Date: Month 12; Completion Date: Month 24)

Subtask 6.2 Collect soil samples using the three techniques discussed in the TCEQ Regulatory Guidance, RG 408 and analyze the soil samples using the Mehlich III extractant. (Start Date: Month 12; Completion Date: Month 24)

Subtask 6.3 Collect soil samples on a 0.5 A grid to be used as the control for the evaluation of the soil sampling methods in RG-408 and analyze the soil samples using the Mehlich III extractant, (Start Date: Month 12; Completion Date: Month 24)

Subtask 6.4 Submit Final Report (Start Date: Month 1; Completion Date: Month 38.)

Deliverables:
- Accuracy soil sampling methods.
- Recommendation of soil sampling method(s) to be used for CAFO.
- Final Report

Coordination, Roles and Responsibilities:

Participating organizations and agencies along with their roles in this project include:

- TWRI will assist in data interpretation and information distribution.
- TCE will administer the project, be responsible for data collection and interpretation, and quarterly, yearly, and final report preparation and educational materials development and programming.
- Texas State Soil And Water Conservation Board - State lead Agency for Agricultural and Silvicultural Non-Point Source Pollution Program.
- NRCS and CEAs will assist in site selection and educational outreach through multi-county meetings and field days.

Public Participation:
The primary goals of this project are to evaluate the Texas PI as an estimator of P runoff potential and to determine which soil test is best correlated with dissolved and suspended P in the runoff. The following subtasks will address the public participation component of this project:

- Conduct educational outreach through CEAs using multi-county meetings to educate landowners and managers about runoff P and use of the PI as a management tool
- Distribute educational materials to landowners, and federal, state and local agencies

- ? Disseminate informational fact sheets to landowners and county/city governing agencies in the watersheds
- ? Conduct field tours and multi-county educational programs
- ? Provide updates and training for EPA, TCEQ, TSSWCB, NRCS and TCE personnel and other groups and organizations on PI use and proposed modifications
- ? One on one technical assistance and educational efforts (at least 25) with landowners in poultry producing areas of the state
- ? Oral and poster presentations at American Society of Agronomy, Soil Survey and Land Resource Workshop, and Surface Mine Reclamation Workshop annual meetings and other events
- ? News articles, fact sheets, information on http://nutrientmanagement.tamu.edu web site, and CEU development for Certified Nutrient Management Specialists
- ? Incorporate revisions of PI into the Nutrient Management Certification Short Course
- ? Include result demonstration findings and recommendations on appropriate Web sites

Measures of Success:
The information attained from the field studies will help validate and/or improve the Texas PI. With this information and other on going studies similar to this across the state, quantitative assessments to predict the amount of P in runoff utilizing the Texas PI can be estimated. The runoff analyses will help determine the form of P, and whether it is mainly dissolved or suspended. This will enable identification of appropriate BMPs to reduce the amount of P leaving fields thus, decreasing the amount of P reaching the surface water resources. Evaluations of two P extractants (Mehlich III and soil solution soluble), at different soil depths, will demonstrate differences among the extractants and help identify the most effective soil depth and extractant to predict runoff P.

Reference To Project In The NPS Management Program:
Category: Agriculture
Milestones:

Project Lead:

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FIELD VALIDATION OF THE TEXAS PHOSPHORUS INDEX IN THE POULTRY PRODUCING AREAS OF TEXAS

Texas Cooperative Extension
FY04 CWA Section 319(h)

PROJECT BUDGET

2/1/04 - 4/31/07

Category	Year 1		Year 2		Year 3		Total	
	Federal	**Match**	**Federal**	**Match**	**Federal**	**Match**	**Federal**	**Match**
I. Salaries and Wages								
A. Principle Investigators	0	$44,917	0	$46,326		$47,656	0	**$138,899**
B. Extension Associates (1.0 FTE)	$37,400		$39,270		$41,234		$117,904	
C. Assist. Res. Sci. TWRI	5,000		5,250		5,512		15,762	
D. Student Labor (2)	12,000		13,000		14,000		39,000	
Sub-total	54,400		57,520		60,746		172,666	
E. Fringe Benefits	12,388	9,673	12,800	9,932	13,227	10,149	38,415	**$29,754**
Total Salaries	**$66,788**	**54,590**	**$70,320**	**56,258**	**$73,973**	**57,805**	**211,081**	**$168,653**
II. Materials and Supplies								
A. Rainfall simulation supplies	19,400		16,700		16,700		54,820	
B. Soil Testing	6,600	6,600	6,600	6,600	6,600	6,600	19,800	**$19,800**
Sub-total	**$28,020**		**$23,300**		**$23,300**		**74,620**	
III. Travel								
A. TCE	18,000		18,000		18,000		54,000	
Sub-total	**$112,808**	**61,190**	**$111,620**	**62,858**	**$115,273**	**64,405**	**$339,701**	**$188,453**
IV. Publications	0		1,010		1,010		2,020	
Sub-total	**0**		**$1,010**		**$1,010**		**$2,020**	
V. Indirect Costs (15% federal- 26% match)	16,922	15,910	$16,743	16,343	17,291	15,620	50,956	**$47,873**
Un-recovered IDC		12,409		12,279		12,680		**$37,367**
TOTALS	**$129,730**	**$89,509**	**$128,363**	**$91,480**	**$132,564**	**$92,705**	**$390,657**	**$273,694**
GRANT TOTAL		**219,239**		**$219,843**		**$225,269**		**$664,351**

FIELD VALIDATION OF THE TEXAS PHOSPHORUS INDEX

Texas Cooperative Extension
FY02 CWA Section 319(h)

PROJECT BUDGET

2/2/04 - 4/31/07

Itemized Budget Justification:

I. Salaries and Wages

Two Extension Associates at 0.5 FTE will be hired on the project. One of the Extension Associate will be in charge of the rainfall simulator. He is the one that designed the trailer according to the specifications from the P Benchmark Soils Project. Half of his salary is requested. The second Extension Associate will work in the field with the rainfall simulations. They will assist with the entire project.

The Assistant Research Scientist will work with TWRI and help with report writing and news releases.

The Student Labor is to hire 2 student workers. One will help in the Soil, Water and Forage Testing Laboratory with the non-routine sample analyses and the other will help with the project in the field. The students will work 20 hours or less during the Fall and Spring semesters and 40 hours during the summer.

II. Materials and Supplies

The operating of the rainfall simulator is estimated to cost about $16,700 per 20 result demonstration sites. The first year a refrigerator ($1,200) is included to store the water samples as they come from the field. The operating cost includes sample containers for sediment and water samples ($1,500) for the first year, ice for storing water samples, analyses on all water samples collected, miscellaneous field supplies, and costs associated with the trailer upkeep, and plumbing and water filtering columns. The columns cost about $1200 per replacement and columns will be replaced about every 3,500 gals of water. Each simulation is estimated to consume about 200 gals of water, thus, the columns will need to be replaced every 17 simulations. We have 80 simulations proposed each year. Therefore, the columns will be replaced 5 times each year. There will be three soil samples collected from each plot (3 samples x 4 plots x 20 sites x $15 analyses = $3,600) and 200 producer samples selected through submissions to the lab (200 samples x $15 = $3,000). The soil testing component will be the analyses of the initial 150 to 200 samples to aid in the selection of the sites. Each analysis is $15 to cover the costs of the Mehlich III and dilute salt extracts. The Mehlich III extract will also be analyzed for colorimetric P on selected samples.

III. Travel

The TCE travel funds will be used for the field result demonstrations and agencies and multi-county educational outreaches. Most of the travel associated with the result demonstrations will involve four to six individuals each trip. We estimate 34 days in the field per year with $80 for per diem and four people ($15,500). Additional funds are requested to be used by the Extension Associate to attend one national meeting to present the results each year (2,000). An additional $500 will be used for vehicle mileage to locate sites. Rental of TCE vehicles to pull the trailer and transport personnel will be at a rate of $0.17 per mile. Per diem for personnel is $80 for lodging and $34 for meals.

IV. Publications

The publications funds will be used to develop educational materials, departmental publications, and at least one referred journal article.

V. Fringe Benefits and Indirect Costs

The fringe benefits are calculated at 28% of the Extension Associates and Research Scientist salaries and 8.25% of the Student Labor wages.

The indirect costs are calculated at 15% as specified by agreement between TSSWCB and TCE.

VI. Matching Funds

The matching funds come from 15% of salaries for Sam Feagley, Mark McFarland, Tony Provin, and John Pitt, 11% indirect cost savings, and 50% for soil sample analyses with the laboratory absorbing the other 50%.